AMENDMENTS TO THE CLAIMS

Claim 1 (currently amended): A method of generating a theoretical no-load slide displacement curve for a mechanical press, comprising:

determining press variables to account for press parameters which effect slide displacement and thereby have a direct influence on the theoretical no-load slide displacement curve for the mechanical press;

providing a computational device;

determining [[the]] a speed of the press;

communicating the speed of the press and values of the press variables to the computational device;

generating [[the]] a theoretical no-load distance above bottom dead center for each increment of a slide stroke, using said speed of the press and said values of the press variables; and

plotting the ~~calculated~~ generated theoretical no-load distance above bottom dead center values vs. time.

Claim 2 (previously presented): The method of Claim 1, wherein said step of determining the press variables comprises:

determining the appropriate variable corresponding to a press drive geometry of the mechanical press;

determining the appropriate variable corresponding to a connecting rod length of the mechanical press;

determining the appropriate variable corresponding to a stroke length of the mechanical press; and

determining the appropriate variable corresponding to a bearing size of the mechanical press.

Claim 3 (currently amended): An apparatus for generating a theoretical no-load slide displacement curve for a mechanical press, comprising:

a speed sensor for sensing a value of press speed;

input means for inputting a plurality of variables corresponding to characteristics of the press; and

computer processor means for generating [[the]] a theoretical no-load slide displacement curve, said computer processor means utilizing said plurality of variables corresponding to characteristics of the press and said value of press speed to generate the theoretical no-load slide displacement curve, said computer processor means

communicatively connected to said speed sensor ~~means~~ and said input means.

Claim 4 (currently amended): The ~~data processing system~~ apparatus as recited in Claim 3, wherein said plurality of variables comprises:

a value of a connecting rod length;

a value of a stroke length;

a value of a press drive geometry; and

a value of a bearing size.

Claim 5 (previously presented): A method of monitoring performance parameters for a mechanical press, comprising:

generating a theoretical no load slide displacement curve for the press;

generating an actual slide displacement curve during a load condition of the press;

determining a contact point on the actual slide displacement curve, the contact point corresponding to the slide contacting the stock material;

establishing a start point on the slide downstroke between top dead center and the contact point;

establishing an end point on the slide upstroke between top dead center and the contact point;

identifying the points on the theoretical slide displacement curve corresponding to the start point and the end point;

identifying the points on the actual slide displacement curve corresponding to the start point and the end point;

superimposing the identified start points on the theoretical and actual slide displacement curves; and

superimposing the identified end points on the theoretical and actual slide displacement curves so that the theoretical and actual slide displacement curves can be compared to obtain indicators of press performance.

Claim 6 (previously presented): The method of Claim 5, wherein said step of generating a theoretical no load slide displacement curve comprises:

determining a speed of the press;

determining an appropriate variable corresponding to a press drive geometry of the mechanical press;

determining an appropriate variable corresponding to a connecting rod length of the mechanical press;

determining an appropriate variable corresponding to a stroke length of the mechanical press;

determining an appropriate variable corresponding to a bearing size of the mechanical press;

providing a computational device;

communicating the speed of the press and the appropriate variables to the computational device;

generating a theoretical distance above bottom dead center for each time increment of a slide stroke based upon the speed of the press and the appropriate variables; and

plotting the theoretical distance above bottom dead center values vs. time.

Claim 7 (original): The method of Claim 5, wherein said step of generating an actual slide displacement curve during a load condition of the press comprises:

monitoring the displacement of the slide of the press; and

plotting slide displacement vs. crank angle.

Claim 8 (original): The method of Claim 5, wherein said step of generating an actual slide displacement curve during a load condition of the press comprises:

monitoring the displacement of the slide of the press; and

plotting slide displacement vs. time.

Claim 9 (original): The method of Claim 5, wherein said step of generating an actual slide displacement curve during a load condition of the press comprises:

monitoring the displacement of the slide of the press using a non-contact displacement sensor; and

plotting slide displacement vs. crank angle.

Claim 10 (original): The method of Claim 5, wherein said step of generating an actual slide displacement curve during a load condition of the press comprises:

monitoring the displacement of the slide of the press using a non-contact displacement sensor; and

plotting slide displacement vs. time.

Claim 11 (currently amended): The method of Claim 5, wherein said step of determining the contact point on the actual slide displacement curve comprises:

determining [[the]] a first inflection point on the actual slide displacement curve; and

establishing the contact point on the actual slide displacement curve as the first inflection point on the actual slide displacement curve.

Claim 12 (previously presented): The method of Claim 5, further comprising:

calculating a distance between the theoretical slide displacement curve and the actual slide displacement curve at a plurality of increments on the slide upstroke between the contact point and the end point;

calculating initially the sum of the distances between the theoretical slide displacement curve and the actual slide displacement curve at each increment;

shifting the actual slide displacement curve;

recalculating the sum of the distances between the theoretical slide displacement curve and the actual slide displacement curve at each increment; and

repeating the shifting and recalculating steps until the sum of the distances between the theoretical slide displacement curve and the actual slide displacement curve at each increment reaches a minimum value.

Claim 13 (previously presented): The method of Claim 5, further comprising:

determining a value of dynamic deflection;

determining a value of static stiffness for the press being monitored;

providing a computational device;

communicating the value of dynamic deflection and the value of static stiffness to the computational device; and

calculating load on the press at any point of the slide stroke by multiplying the value of dynamic deflection for the relevant point of the slide stroke by the value of static stiffness.

Claim 14 (original): The method of Claim 13, wherein said step of determining a value of dynamic deflection comprises:

measuring the distance along the ordinate between the theoretical no load slide displacement curve and the actual slide displacement curve.

Claim 15 (original): The method of Claim 14, further comprising:

calculating load on the press for each time increment of a slide stroke; and

plotting calculated load vs. time.

Claims 16-19 (canceled)

Claim 20 (currently amended): An apparatus for monitoring a running press, comprising:

a speed sensor for sensing a value of press speed;

input means for inputting a plurality of variables corresponding to characteristics of the press;

a computational device for generating [[the]] a theoretical slide displacement curve, said computational device utilizing said plurality of variables corresponding to characteristics of the press and said value of press speed to generate the theoretical slide displacement curve, said computational device communicatively connected to said sensor means and said input means ~~and said storage means~~; and

a non-contact displacement sensor for sensing slide displacement during an actual load condition of the press, said non-contact displacement sensor communicatively connected to said computational device, said computational device plotting sensed slide displacement vs. a count quantity, said computational device determining the contact point on the actual slide displacement curve which corresponds to the slide contacting the stock material, said computational device establishing a start point on the slide downstroke between top dead center and the contact point, said computational device establishing an end point on the slide upstroke between top dead

center and the contact point, said computational device identifying the points on the theoretical slide displacement curve corresponding to the start point and the end point, said computational device identifying the points on the actual slide displacement curve corresponding to the start point and the end point, said computational device superimposing the identified start points on the theoretical and actual slide displacement curves, said computational device superimposing the identified end points on the theoretical and actual slide displacement curves so that the theoretical and actual slide displacement curves can be compared to obtain indicators of press performance.

Claim 21 (original): The apparatus as recited in Claim 20, wherein said computational device comprises:

a microprocessor.

Claim 22 (previously presented): The apparatus as recited in Claim 20, wherein said plurality of variables comprises:

a value of a connecting rod length;

a value of a stroke length;

a value of a press drive geometry; and

a value of a bearing size.

Claim 23 (original): The apparatus as recited in Claim 20, wherein said count quantity is a measure of time.

Claim 24 (original): The apparatus as recited in Claim 20, wherein said count quantity is a measure of crank angle.

Claim 25 (previously presented): An apparatus for monitoring the load on a mechanical press, comprising:

a speed sensor for sensing the speed of the press;

a non-contact displacement sensor for sensing slide displacement during an actual load condition of the press;

input means for inputting a plurality of press variables corresponding to characteristics of the press; and

a computational device, said computational device communicatively connected to said speed sensor, said non-contact displacement sensor and said input means, said computational device generating a theoretical no load value of slide displacement based upon the speed of the press and the plurality of press variables, said computational device computing a value of dynamic deflection by computing the difference between the theoretical no load value and the corresponding actual load value of slide displacement, said computational device multiplying the value of dynamic deflection by the value of static stiffness of the mechanical press to determine a value of load on the press at a point of the slide stroke.

Claim 26 (previously presented): The apparatus as recited in Claim 25, wherein said plurality press of variables comprises:

a value of static stiffness corresponding to the press being monitored;

a value of a connecting rod length;

a value of a stroke length;

a value of a press drive geometry; and

a value of a bearing size.